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1. A system for combining spatial and linear (attribute) data in a single relational database, comprising:
  - a computing device having a user interface;
  - a relational database connected to the computing device and accessible by structured query language, the database comprising spatial and attribute data related to geographic information; and
  - means for providing dynamic segmentation of permanent anchor sections, an anchor section defining a spatial reference for a geographic element in the relational database.
2. A system as recited in claim 1, wherein the relational database is accessed via an object-oriented front-end.
3. A system as recited in claim 1, wherein the relational database further comprises:
  - integrated temporal data for maintaining historical records.
4. The system as recited in claim 1, wherein the relational database is also accessible by a graphical information system viewing application.

1           5.     A system as recited in claim 1, further comprising means for  
2 performing automated database maintenance, making the multiple databases of road  
3 network data consistent with one another.

1           6.     A system as recited in claim 1, further comprising:  
2           at least one additional computing device connected to the relational database,  
3 wherein the relational database is stored in a distributed data environment.

1           7.     A method for combining spatial and linear (attribute) data in a single  
2 relational database, comprising:  
3           providing permanent anchor sections representing physical sections of a  
4 roadway, an anchor section defining a spatial reference in road data, the anchor  
5 sections also integrated with linear data to form a road network;  
6           associating attributes and linear events with positions in the road network;  
7           storing linear event data related to anchor sections in a relational table;  
8           storing road attribute data by associating each attribute with locations specified  
9 in terms of a linear referencing method (LRM);  
10          implementing a dynamic segmentation function for conducting dynamic  
11 segmentation on a selective basis;  
12          maintaining historical data related to anchor sections and linear event data;

13 enabling the creation of an interior intersection within the road data, where an  
14 interior intersection to an anchor section is defined by offsets from an end of the  
15 anchor section;

16 synchronizing spatial and linear data, for tying spatial data to a physical  
17 location represented by the road network; and

18 utilizing meta-data definitions for database elements in a data dictionary, the  
19 data dictionary defining an implementation of the relational database, resulting in an  
20 extensible relational database model.

1 8. A method as recited in claim 7, further comprising:  
2 dynamically segmenting permanent anchor sections by adding interior  
3 intersections using offset information.

1 9. A method as recited in claim 7, wherein the database model uses an  
2 open architecture.

1 10. A method as recited in claim 7, wherein linear event data is stored by  
2 storing each value anchored linear event combination in a separate table record.

1 11. A method as recited in claim 7, wherein linear event data is stored by  
2 storing each value anchored linear event combination in a different table record with

3 the same anchored linear events used for all event data, resulting in dynamic  
4 segmentation.

1 12. A method as recited in claim 7, wherein the linear event data comprises  
2 an event value; and an anchored linear event related to at least one anchor section, the  
3 anchored linear event identifying start and end offsets of an anchor section.

1 13. A method as recited in 12, wherein jurisdictional areas are maintained  
2 as spatial data, the method further comprising:  
3 storing jurisdictional area polygons in the database;  
4 accessing event data for a jurisdictional area using a spatial query;  
5 identifying anchor sections contained within a specified jurisdictional area; and  
6 compiling event data for the identified anchor sections using a relational query.

1 14. A method as recited in claim 13, further comprising:  
2 summarizing anchor section event data using a summary query.

1 15. A method as recited in claim 13, further comprising:  
2 summarizing anchor section event data using a report query.

1 16. A method as recited in claim 13, further comprising:  
2 pre-processing spatial queries for desired jurisdictional areas; and

3 storing results of the pre-processed spatial queries for desired jurisdictional  
4 areas in a location accessible by a query program, resulting in more efficient access to  
5 event tables stored by the pre-processing queries.

1 17. A method as recited in claim 7, further comprising:

2 importing road network data in the form of a link-node network by adding  
3 additional table columns required to maintain consistency of the link node network  
4 with a spatial data engine for the road network data, the adding further comprising:

5 creating an entry in an anchor section table for each link in the imported road  
6 network link table;

7 assigning an anchor section identifier (ID) to the entry;

8 copying associated spatial data from the imported data into the spatial data  
9 engine road network data; and

10 copying other data associated with the link to define the road network.

1 18. A method as recited in claim 7, further comprising:

2 presenting data as tabular query results and reports.

1 19. A method as recited in claim 7, further comprising:

2 using standard geographic information system (GIS) tools to produce maps

3 using data in the road network.



1        26.    A method as recited in claim 21, further comprising:  
2        presenting results of the querying in a simple tabular display.

1        27.    A method as recited in claim 7, further comprising:  
2        converting location reference data stored by a traditional linear referencing  
3        method to an anchor linear referencing method as a collection of anchor sections and  
4        intersections that represent the roadways, the converted data for use with the road  
5        network comprised of anchor sections integrated with linear data.

1        28.    A transportation information system, comprising:  
2        at least one computing device having storage for data and computer code and  
3        capable of executing object oriented computer code;  
4        a current data repository for storing current transportation network data and  
5        linear event data;  
6        an historical data repository for storing historical transportation network data  
7        and linear event data;  
8        a current data query program comprising computer code for querying the  
9        current data repository;  
10       an historical data query program comprising computer code for querying the  
11       historical data repository;  
12       a report generator comprising computer code for generating reports using data  
13       retrieved during a querying of a data repository;

23 from an end of an anchor section.

1 31. A system as recited in claim 28, wherein the computer code is object-  
2 oriented.



1           32.     A system as recited in claim 28, wherein attributes and properties are  
2 associated with elements in the network and disjointed attributes of an anchor section  
3 are enabled.

1           33.     A system as recited in claim 28, where the transportation network is a  
2 road network.

1           34.     A system as recited in claim 28, where the transportation  
2 network is for waterway shipping lanes.